

Rocky Mountain region, the precipitation was everywhere less than normal and the deficiency was large and detrimental to crop growth over much of the upper Mississippi and lower Missouri Valleys and Middle Plains region, where it was among, and in some cases, the driest ever experienced in May.

Farther west, particularly over the Pacific coast sections, the deficiency in precipitation, which has persisted locally for many months, continued, and in many portions of California, Nevada, Oregon, and Washington and nearby sections of other States it was the driest May of record. At Eureka, Calif., May was the eighth consecutive month with precipitation below normal, and the total deficiency since the first of the year was nearly 20 inches. Similar conditions exist in other portions of California, also in Oregon and Nevada.

Due to deficient snowfall during the past winter over much of this region, and to its early melting on account of the high temperatures, the rivers in many sections are at the lowest stages ever known and steps are already being taken to conserve the diminishing water supplies.

#### SNOWFALL

Some heavy snows fell during the month in the middle Rocky Mountain States, particularly near the end, the depths ranging up to 50 inches or more at some of the more elevated points. Elsewhere in the Rocky Mountain system there was little or no snowfall, and no meas-

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#### SEVERE LOCAL HAIL AND WIND STORMS, MAY, 1924

[The table herewith contains such data as have been received concerning severe local storms that occurred during the month. A more complete statement will appear in the Annual Report of the Chief of Bureau]

Place	Date	Time	Width of path (yards) <sup>1</sup>	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
Peabody (near), Kans.	2					Heavy hail	Damage not reported	Official, U. S. Weather Bureau.
Fort Bayard, N. Mex.	2	12:10-12:30 p. m.	2 mi.		\$4,000	Damaging hail	Considerable damage to fruits, path 5 miles long.	Do.
Indianapolis, Ind.	3					Thunderstorm with wind and hail	Considerable damage to plants and window panes.	Do.
Seneca County, Ohio. (s. w. part of)	3	p. m.				Tornadoic wind	Heavy property damage	Do.
Cocoa Grove, Fla.	4					Heavy hail	Minor damage	Do.
Boone County, Mo.	5			2		Thunderstorm	School boy of Columbia and farmer near Centralia killed by lightning.	Do.
Upland, Nev.	6	5-6 p. m.	1,200.			Hail	About 75 per cent of fruit crop and gardens damaged. Path 10 miles long.	Do.
Idlewild, Tenn.	6			1		Electrical	Farmer and horse killed by lightning.	Do.
Dongola, Ill.	6				3,000	Hail	Crops damaged	Do.
Grant County, Ky. (n. part of)	7	2 p. m.	1,760.			Heavy hail	Early garden truck damaged. Path several miles long.	Do.
St. Marys Ohio, (vicinity of)	7					Wind	Electric light and trolley poles blown down	Do.
Bradshaw, Tex.	8	7 p. m.	3.5 mi.			Hail	Entire loss of seed planted	Do.
Mercedes, Tex.	8	6 p. m.	880.		5,000	Heavy hail	Roofs damaged. Greater part of storm over unproductive land. Path 2 miles long.	Do.
Trzevant (near), Tenn.	8					Wind, rain, and hail	Farm lands washed, fruit trees uprooted, peaches and strawberries injured.	Do.
Marquette County, Mich.	8-9				10,000	Glaze	Damage principally to telegraph and telephone poles and wires.	Do.
Seguin, Tex.	9	1 a. m.	6-7 mi.			Heavy hail	All cotton in 100 square miles destroyed; corn suffered and oats destroyed.	Do.
New Braunfels, Tex.	9	1:50 a. m.	12 mi.			Hail	Window panes broken; fruit entirely destroyed, Stones were the size of walnuts.	Do.
Corpus Christi, Tex.	10	1:10 a. m.			15,000	do.	Damage confined mostly to windows, roofs, and garden truck.	Do.
Mayesville, S. C.	11	7:15 p. m.	33.		5,000	Tornado	Character of damage not reported. Short path.	Do.
Vega, Tex.	11	6 p. m.	4 mi.		10,000	Hail and electrical	Heavy damage; also some stock killed by lightning. Length of path 18 miles.	Do.
Clairemont, Tex.	12	2:30 p. m.	1-5 mi.			Heavy hail	Small crops total loss. Some roofs damaged.	Do.
Hermleigh, Tex.	12	6 p. m.				do.	Total loss of crops. Severe damage to houses, fruit, etc.	Do.
Jayton, Tex.	12	4 p. m.	2 mi.			do.	All buildings in path severely damaged	Do.
Jayton, Tex.	13	7 p. m.	13.5 mi.			do.	do.	Do.
Hermleigh, Tex.	13	10:30 p. m.	3 mi.			do.	Total loss of crops. Buildings, fruit, etc., damaged.	Do.
Ablene, Tex.	13	11 p. m.	2-3 mi.		10,000	do.	Considerable damage. Path 5 miles long.	Do.
Plainview, Tex.	13	During night.	3 mi.		25,000	do.	Crop loss varies from 6 per cent to total. Length of path 4 miles.	Do.
Sylvester, Tex.	13	9 p. m.	8 mi.		100,000	do.	Buildings and crops severely damaged. Path 12 miles long.	Do.
McCauley, Tex.	13	8:10 p. m.	2-5 mi.		50,000	do.	Total loss of crops; houses considerably damaged and poultry injured.	Do.
Beville, Tex.	14	12 midnt.	4 mi.		5,000	do.	Extensive area of cotton and corn damaged	Do.
Nixon, Tex.	14	9 p. m.				do.	About 5,000 acres of corn and cotton destroyed	Do.

<sup>1</sup> mi. signifies miles, instead of yards.

urable amounts occurred in the mountains of California and Nevada, and that on the ground from previous months had practically disappeared. On some of the more elevated districts where the snow usually lies until July, it had all disappeared early in May. Snowfall was reported from most northern districts at some time during the month and some rather heavy falls occurred from Montana to the upper Lakes near the middle of the first decade.

#### RELATIVE HUMIDITY

Despite the generally cool weather during the month over the districts east of the Rocky Mountains, and the cloudy, rainy conditions over the more eastern districts, the percentage of relative humidity over the greater part of this territory was less than normal. In the Northeastern States, however, there was a general, though mainly slight excess, and local averages slightly above normal occurred elsewhere, notably on the eastern slopes of the middle and southern Rocky Mountains. Over the Plateau and Pacific coast States there were general and frequently large deficiencies in the percentage of relative humidity, which would be expected in view of the high temperatures and general lack of precipitation.

Much cloudy, rainy weather prevailed over the northern and central portions of the country from the Mississippi Valley eastward, some sections having less than one-third the possible amount of sunshine. Elsewhere sunshine was usually sufficient.

## Severe local hail and wind storms, May, 1924—Continued

Place	Date	Time	Width of path (yards) <sup>1</sup>	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
St. George, Ga.	15					Heavy hail	Much damage to fruit, roofs, and window panes.	Official U. S. Weather Bureau.
Brady's Bend, Pa. (and vicinity)	18	9:30 a. m.				do	Injury to garden truck.	Do.
Temple Hill and Game, Ky.	19	3 p. m.	4 mi.		5,000	do	Crops damaged.	Do.
Havana (near), Kans.	19	5 p. m.				do	Extent of damage not known. Considered one of the most severe storms ever known locally.	Do.
Seymour, Mo.	19		880			Thunderstorm and hail.	Large trees uprooted, houses and barns demolished, crops hurt. Path 5 miles long.	Do.
Greene and Webster Counties, Mo. (n. part of)	19					Wind and hail.	All fruit, wheat, and corn in path ruined. Hail confined to northeast part of Greene County.	Do.
Blaine and Canadian Counties, Okla.	19	P. m.			2,500	Hail	Damage not reported.	Do.
Lawton, Okla. (10 miles ne. of)	19					do	Wheat, corn, oats, and cotton on several farms ruined.	Do.
Rookingham, Caswell, Warren, and Halifax Counties, N. C. (parts of)	20		3-4 mi.			Heavy hail.	Extensive crop damage.	Do.
Abbott, N. Mex. (4 miles north of)	20		1,760			Hail	Minor damage. Storm over sparsely settled country.	Do.
Dallas County, Tex. (s. portion of)	20	3:30-4:30				Hail and wind	60 per cent crop loss reported.	Do.
Kaufman, Tex. (2 miles east of)	20	5:30 p. m.	50		50,000	Tornado and hail.	Livestock injured and buildings and crops damaged; 2 persons injured. Path 7 miles long.	Do.
Flint, Tex.	20	6 p. m.	1-2 mi.			Hail	Estimated 50 per cent of tomato crop ruined. Path 5 miles long.	Do.
Coleman, Tex.	20	4 p. m.	3 mi.		10,000	Heavy hail	Crops ruined and some poultry killed. Path 30 miles long.	Do.
Milan, Tenn., and vicinity	20					Electrical and wind.	One barn burned, 4 others and some trees blown down.	Do.
Springer, N. Mex.	21					Heavy hail	Extent of damage not reported.	Do.
Cheyenne, Wyo.	22		3 mi.			do	No material damage reported.	Do.
Buckingham, Fla.	23		2 mi.		5,000	Moderate hail	Considerable damage.	Do.
McLeansboro, Ill.	23				8,000	Wind	Buildings, trees, and wires damaged; 2 persons injured.	Do.
Waterloo, Ill.	23				15,000	do	Considerable property damage.	Do.
Southeastern Missouri	23			1		Electrical, wind, and hail.	Extensive crop damage; 7 persons injured.	Do.
St. Louis (city) and St. Charles County, Mo.	23					Thunderstorm and wind.	Damage principally to wires and trees.	Do.
Charity, Mo.	23					Wind, rain, and hail.	Houses and barns damaged; nearly a total loss of crops in path of hail. Hail 18 inches in some places.	Do.
Fayetteville, Ark., and vicinity	23	p. m.			2,500	Wind	Grounds and buildings of university damaged.	Southwest Times Record (Fort Smith, Ark.).
Elkhart (near), Kans.	23	3-4 p. m.	10 mi.		10,000	Heavy hail	Minor damage in vicinity. Character of damage not reported.	Official, U. S. Weather Bureau.
Marion and Chase Counties, Kans.	23	2 p. m.	4 to 8 mi.			Hail	Considerable damage to wheat, alfalfa, and fruit.	Do.
Morris County, Kans.	23	1 p. m.	4 mi.			do	Wheat and other crops beaten to ground.	Do.
Pomona (near), Kans.	23	2-3:30 p. m.				do	Gardens and fruits damaged.	Do.
LeRoy (near), Kans.	23	3:30-4 p. m.	2,640		20,000	do	Roofs damaged and poultry killed.	Do.
Fort Smith, Ark.	23	6:41 p. m.				Thunderstorm	General damage done.	Do.
Hartford, Conn., and vicinity	24					High winds	Trees and wires down, trolley service delayed, telephones out of order; crop loss heavy; 1 person injured.	Do.
Hall and Jackson Counties, Ga.	24				1,000	Hail	Crops injured.	Hartford Courant (Conn.).
Tuscola, Tex.	25	8 p. m.	10 mi.		40,000	Hail and rain	Considerable crop damage. Path 12 miles.	Official, U. S. Weather Bureau.
Imperial, Tex.	25	5 p. m.	3 mi.		10,000	Hail	Crops suffer; other minor damage. Path 10 miles long.	Do.
Eastland, Tex.	26	10 p. m.	2 mi.		1,000	do	Some damage to fruit and buildings. Path 4 miles long.	Do.
Red Oak, Tex.	26	A. m.				High wind	Two seed houses wrecked.	Dallas Morning News (Tex.).
Hubbard, Tex.	26	A. m.				Tornado (probably)	Eleven buildings demolished.	Do.
Vicksburg, Miss.	26	1:45 p. m.				Thunderstorm	Several dwellings and a number of trees damaged; electric current cut off in many parts of the city.	Official, U. S. Weather Bureau.
Leland (near), Miss.	26	P. m.		3		Tornado	Path several hundred yards wide; 17 persons injured and about 20 houses destroyed.	Daily States (New Orleans, La.).
Elkmont (near), Ala.	26	11:45 p. m.		8	5,000	do	Minor property damage.	Official, U. S. Weather Bureau.
Summit to Brewer, Miss.	26-27	11 p. m.-1:15 a. m.		12		do	Heavy property loss and a number of persons injured.	Do.
Lee County, Miss., to Marion County, Ala.	27	a. m.	1,760	3		do	Five persons hurt; 4 houses destroyed; numerous buildings damaged.	Meridian Star (Miss.) Official U. S. Weather Bureau.
Norubee County, Miss., to Pickens County, Ala.	27	a. m.	1,760	2	10,000	do	Several hurt; 3 stores and many houses wrecked.	Do.
Bay Springs to Increase, Miss.	27	12:40 a. m.	150-200	3		do	Eight injured; several houses destroyed.	Official, U. S. Weather Bureau.
Moelle to Waynesboro, Miss.	27	3 a. m.		2		do	Four persons hurt and much property damaged.	Official, U. S. Weather Bureau; Meridian Star (Miss.).
Empire (near) to White Springs, Ala.	27	2:15-4:30 a. m.	440	11		do	Damage near Empire \$19,000; considerable at White Springs. Fifteen persons injured.	Official, U. S. Weather Bureau.
Burnsville, Ala.	27	3:40 a. m.			3,000	do	Nine houses destroyed and 2 persons slightly injured.	Official, U. S. Weather Bureau; Advertiser (Montgomery, Ala.).
Florence (near), to Smithboro (near), S. C.	27	p. m.	100-300		18,000	do	Four buildings wrecked and 2 persons injured.	Official, U. S. Weather Bureau.
Eureka (near) to St. Matthews (near), S. C.	27	p. m.	30-800		22,000	do	Two persons injured and some property damage.	Do.
Fredonia (near) to Neodesha (near), Kans.	27	6:30 p. m.				Hail	Crops laid waste and trees uprooted.	Do.
Alden (near), Kans.	27	12:30 p. m.				do	Wheat damaged as much as 75 per cent in places. Fruit also damaged.	Do.
Southern part of Barton and northern part of Stafford Counties, Kans.	27	p. m.				do	Considerable damage to wheat; in places ground covered 3 to 4 inches with hail.	Do.
Wichita (near), Kans.	27	4-5 p. m.	4 mi.		75,000	do	Great damage to fruit.	Do.
Rowland (near), N. C.	27	12:30 p. m.	100-300		5,000	Wind	Several barns razed; timber damaged.	Do.
Stringtown, Okla. (5 miles nw. of)	27	9 p. m.		5	4,000	do	Some property damage and 2 persons injured.	Do.

<sup>1</sup> mi. signifies miles, instead of yards.

*Severe local hail and wind storms, May, 1924—Continued*

Place	Date	Time	Width of path (yards) <sup>1</sup>	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
Fort Smith, Ark.....	27	P. m.....			50,000-75,000	High wind.....	Heavy property damage. Fort Smith Light and Traction Company probably heaviest losers.	Official U. S. Weather Bureau.
Watts, Okla.....	27	7 p. m.....	2-3 mi.			Heavy hail.....	Considerable property damage.....	Do.
Do.....	28	7 p. m.....	2-3 mi.			do.....	do.....	Do.
Wetumka to Warner, Okla.....	28	5:30-6:15 p. m.....	133-1,760	9	190,000	Tornado.....	Heavy property damage; 37 persons injured.....	Do.
Stigler, Okla., to Fort Smith, Ark.....	28	7 p. m.....	300-150	5	91,000	do.....	Heavy property and crop damage; 15 houses at Gans wrecked; 27 persons injured.	Do.
Meeker to Davenport, Okla.....	28	4:30 p. m.....	2 mi.		20,000	Hail.....	Considerable damage.....	Do.
Dearing (near), Kans.....	28	6-8 p. m.....				do.....	Many wheat and oat fields devastated; roofs damaged and window panes broken.	Do.
Washington County, Ark.....	28	6:30 p. m.....				Tornado.....	Heaviest damage at Farmington; 7 houses demolished and orchards badly damaged.	Do.
Do.....	28	P. m.....			100,000	Hail and rain.....	Orchards, vineyards, and strawberries damaged. Storm followed tornado of same date.	Do.
Provo Bench, Utah County, Utah.....	29	7-7:10 p. m.....	2 mi.		5,000	Moderate hail.....	Fruit and garden plants injured.....	Do.
Marinette, Ariz.....	30	6-7:30 a. m. or p. m.....				Heavy hail.....	1,000 acres of cotton damaged 25 per cent. Store unroofed by wind.	Do.

**STORMS AND WEATHER WARNINGS**

By EDWARD H. BOWIE, Supervising Forecaster

**WASHINGTON FORECAST DISTRICT**

The month as a whole may be characterized as a quiet one, there being few storms of consequence, and in all cases the warnings were confined to the middle and north Atlantic coasts.

The first display was made on the evening of the 3d, when southeast warnings were ordered from Sandy Hook to Eastport, in connection with a disturbance over eastern Ontario. Warnings were again disseminated on the evening of the 7th, from the Virginia Capes to Boston, due to the northward movement of a secondary that developed over the south Atlantic States. The storm continued its slow northward movement and warnings of strong winds, thick weather, and rains were issued on the evening of the 9th from Sandy Hook to Portland. Another secondary that developed over the south Atlantic coast and moved to southeastern Virginia required the issuance of northeast warnings from Delaware Breakwater to Eastport. The necessity for warnings did not occur again until the 18th, when a disturbance of marked intensity was central southeast of Hudson Bay. Southwest warnings were ordered on the morning of that day for the Atlantic coast from Delaware Breakwater to Eastport. Southwest storm warnings were again displayed on the morning of the 24th from the Virginia Capes to Eastport. Small-craft warnings were displayed at Mobile and Pensacola during the 26th.

Warnings of light frosts were required on a number of days for portions of the Ohio Valley, the lower Lake region, and the north and middle Atlantic States.

**CHICAGO FORECAST DISTRICT**

From the point of view of the forecaster, May, 1924, in the Chicago Forecast District was a month of decided activity. Frost warnings were issued for some part of the district on every day but the 16th, and likewise frost occurred in some part of the district every night except that of the 16-17th. Furthermore, the month was much stormier than usual on the Great Lakes, winds of storm force or within four miles thereof having occurred at some one or more Lake stations on 20 days.

*Frost warnings.*—At the opening of the month the growth of vegetation had advanced sufficiently to be injured by frost northward across Nebraska, Iowa,

southern Wisconsin, and Indiana. During the following two weeks the susceptible stage was reached over most of the remainder of the district, except the northern Lake region where frost warnings were not needed until about the close of the month. The dates on which the most general frost warnings were issued include the 6th to 10th, inclusive, 13th, 14th, 18th to 21st, inclusive, 23d to 25th, inclusive, and the 29th and 30th. The most damaging frost effects appear to have been those of the 11th in portions of Iowa, of the 19th and 20th in lower Michigan, and on several dates during the week ending on the 26th in North Dakota, Iowa, lower Michigan, and Indiana. Frosts were numerous in the Wisconsin cranberry bogs, and one observer described the month as a "terrible one."

*Storm warnings.*—There were three principal storm periods on the Great Lakes, namely, those of the 5-9th, 17-19th, and 23d-24th, all dates, inclusive. Altogether storm warnings were issued on nine days, and small-craft warnings on six additional days.

The first storm warning of the month was issued at 1 p. m. of the 5th for Lake Superior west of Marquette, northeast warnings being ordered. Noon special observations on that date had shown a disturbance of increasing intensity centered over the northern Plains, the lowest pressure being 29.48 inches. At the same time a high pressure area appeared in northern Manitoba, where the barometer read 30.24 inches. At 10 p. m. of the same date these warnings were extended over the Escanaba and Green Bay districts of Lake Michigan. By the morning of the 6th the disturbance was centered over Iowa with somewhat decreased energy, but verifying wind velocities had occurred during the night over most of the region where the warnings were displayed. Accordingly, small craft-warnings were issued for the remainder of the Great Lakes, and later, at 1 p. m., the warnings were continued on that portion of Lake Superior where already displayed. However, the latter were lowered at 10 p. m. As the disturbance moved slowly eastward it increased in intensity, so that it was necessary to issue northeast warnings on the night of the 7th for the northern portion of the Alpena District of Lake Huron. By the following morning the storm had still further increased in energy, and in connection with a high pressure area over Ontario had created a strong gradient across most of the Lake Region. As a result strong winds or moderate gales had set in over Lake Superior and the northern portions of Lakes Michigan and Huron. Therefore, the northeast warnings were extended over the remainder of the Great Lakes.